

**FAKULTI SAINS COMPUTER AND
TEKNOLOGI MAKULMAT
UNIVERSITI MALAYA.**

WXES3181 AND

WXES3182

**COMPUTERISED CAR WORKSHOP
SYSTEM**

STUDENT NAME: SIVANESEN A/L VAITILINGGAM

MATRIC NO: WQT98018

SUPERVISOR: PUAN AZWIN YUSOF.

MODERATOR: DR. LEE SAI PECK.

TABLE OF CONTENT

CHAPTERS

	PAGE
1.0 INTRODUCTION.....	2
1.1 BACKGROUND OF THE STUDY AND THE ORGANISATION	2
1.1.1 Objective of the System	3
1.1.2 5 W's	3
1.1.3 SCOPE OF PROJECT	4
2.0 LITERATURE REVIEW.....	5
2.1.1 Functions and strength of the current system.....	5
2.1.2 Problems in the current system.....	6
2.1.3 Economic feasibility study.....	7
2.1.4 Operational feasibility study.....	11
2.1.5 Technical feasibility study.....	13
2.1.6 Management of the project.....	14
3.0 METHODOLOGY.....	16
3.1.1 Waterfall.....	16
3.1.2 Fact finding.....	16
4.0 NEW SYSTEM ANALYSIS.....	17
4.1.1 Determining system requirements.....	17
4.1.2 Findings of the studies and the new systems requirements structuring....	18
4.1.3 Non-Functional.....	20
4.1.4 Selection and acquisition of hardware and software.....	20
5.0 SYSTEM DESIGN.....	26
5.1.1 Database Design.....	26
5.1.2 DFD diagram.....	29

5.1.3	E-R Diagram	30
5.1.4	Structure Chart	31
5.1.5	Interface diagram	32
6.0	TESTING AND SOFTWARE MAINTENANCE	33
6.1	Introduction	33
6.2	Types of error	33
6.3	Type of testing	34
6.4	Testing result analysis	39
6.5	Maintenance	39
7.0	SYSTEM IMPLEMENTATION and CONCLUSION	41
7.1	Introduction	41
7.2	Problem and action taken	41
7.3	System advantages	42
7.4	System disadvantages	42
7.5	Future planning and development	42
7.6	Conclusion	43

BIBLIGROPHY

APPENDIX

1.0 INTRODUCTION

1.1 BACKGROUND OF STUDY AND ORGANISATION.

Today's car workshop centres are sophisticated businesses and their popularity is ever growing in the modern society. One of the primary car workshops in Penang is the Impact Workshop, which currently has about 400 customers and provides a wide range of services. The workshop was started, 5 years ago. Today, the workshop is very popular among Penangites. Since it first started, the business in workshop grew rapidly every year. This is due to the hard work of owner and his good management skills and also good customer service provided by the employees. The organisation structure of the

DECLARATION PAGE

"This report is prepared as a partial fulfilment towards graduation requirements for Bachelor of Information Technology, University Malaya. This report and all products of the project (source code, system/application, user manual etc.) are the copyright of University Malaya. No part of this report and project shall be reproduced, stored in a retrieval system, or transmitted by any means, electronic, mechanical, photocopying, recording or otherwise, without permission from University Malaya

1.0 INTRODUCTION

1.1 BACKGROUND OF STUDY AND ORGANISATION.

Today's car workshop centres are sophisticated businesses and their popularity is ever growing as the modern society. One of the premier car workshops in Penang is the Impian workshop, which currently has about 400 customers and provides a wide range of services. The workshop was started, 5 years ago. Today, the workshop is very popular among Penangites. Since it first started, the business in workshop grew rapidly every year. This is due to the hard work of owner and his good management skills and also good customer service provided by the employees. The organisation structure of the car workshop is mainly divided into the clerks and other lower level staffs (mechanics).

Currently, the uses manual systems for handling most of the operation and management activities of the workshop. As such, the workshop faces a lot of problems and errors in handling the operations and the current system is very time consuming. The type of errors and problems that are faced by the workshop system are like weak control over facilities, weak facility booking systems, weak control over stock and inventory, difficulty in handling the sales operation of the workshop and the current system does not provide a good management and business view of the workshop.

As such, the owner has optioned for the manual procedures in the workshop to be computerized to improve operational efficiency and support management activities. As the workshop is facing a lot of problems, an efficient information system to manage the daily operations and administration of the workshop is the best solution to overcome these problems. The owner optioned for developing an information system, that he felt, in the long run, information system will be more cost-effective and it can support his future plans. Thus, owner hired myself to study and develop an information system to handle the operations and support management activities of his workshop.

1.1.1 SYSTEMS OBJECTIVE.

The purpose of this project is to develop a stand-alone software application solution to manage the day to day operations and management of the workshop using the structured analysis and design method and using Access and Visual Basic software. The reason for development of this new system is mainly to overcome the problems faced in the current manual and conventional methods used in the workshop where occurs a lot of errors in the current system. Furthermore, the proposed system is expected to create business opportunities and increase competitive advantage of the workshop system.

1.1.2 5 W's

What

To develop a stand alone information system (database approach), which can control and monitor the operations and management of computerize workshop system which can be accessed by the management, clerks and mechanics in all department and facilities. Among the tasks that the system must support is daily transactions of the workshop, generate reports, monitor inventory and monitor the employee.

Why

The amount of customer has become very large and the current number of employees is not enough to handle the daily operations of the workshop. There are a lot of errors made by the employees and the current system does not provide a good management view workshop system. The new database system will support good management view of the business, support daily operations of the workshop and reduce disadvantages of previous conventional system

Where

The stand-alone system is programmed specially for the Impian workshop system. If the stand-alone system is a success, a LAN client/server network based on the stand-alone system will be created for the Impian workshop in the future. The workstation PC will be situated in the back

office for network administration by a database administrator who is a member of the management and there will be to other PCs to be used by many other employees in the management department.

Whom

The proposed system can be accessed by the all the employees of the Impian workshop which includes both the administration/management staffs, clerks and mechanics. However the level of access into the system will vary according to the job positions of the employees.

When

The owner of the centre requests that the new system should be fully operational by 1st of April 2003. The project will commence on 25th of July 2002. The lead-time 29 weeks and the project is expected to be completed on 25th of February 2003.

1.1.3 SCOPE OF PROJECT

The scope of the project is to develop a computerized database system for the management and administration of Impian workshop which is capable of providing the main systems features needed for a car workshop as below: -

1. **Customer Maintenance:** the system should provide means to register new customer cars online, maintains customer information in an orderly and easy to use fashion and customer's records can be viewed and modified easily.
2. **Facilities Maintenance and Booking:** The system should also allow customer profiling whereby servicing schedule and online booking facilities for servicing the car.
3. **Stock Control and Inventories :** a simple, user friendly stock control and inventory ordering feature for sales retail items should be included with the system.
4. **Point of Sale :** the system should provide a feature to carry out sales operations of the workshop.
5. **Course Management :** the system should provide means for the workshop manage the service offered in the workshop and keep records of the participants in the courses.
6. **Reporting :** the new system should provide a wide range of reports and receipt which will be very useful for the management of the car workshop.

2.0 LITERATURE REVIEW

2.1.1 FUNCTIONS AND STRENGTH OF THE CURRENT SYSTEM.

Impian car workshop still uses the conventional manual system in doing their business. The activities that goes on in the workshop are as follows. When a potential customer arrives, registration is done manually and a receipt is given for the registration fees by the clerks. The clerk then passes the new customer information to the management where by the management enters the information in the customer files in the computer using Excel system. All processes of adding customers, deleting customers, editing customers and search for customer is done by the management. The clerks do have the access to the customer files.

After a Customer has registered, the clerks will prepare a manual spreadsheet form for that customer. The form contains all the customer information and all applications of payment, service reservation. The form serves as the only source of information regarding customer. All inventories are purchased be the management. The management enters the new sales items inventory into inventory files in the computer using Excel system. All processes of ordering inventory from the supplier is done by the management. The clerks do have the access to the inventory files.

All the sales and transactions are done using only cash drawers. When customer does a service, their purchase is entered into the cash drawer and a receipt is given to the customer for their service. Information of quantity of inventory in sales is only known through manual counting. Cash drawers are also used in all the facilities for producing receipt when the customer pay entrance fee during check in.

For producing reports the management has to go through a lot of steps. First of all, the employees have to check through all the individual customer forms to gather information of customer status, service history, sales report and also records of the inventory in hand. The management then have to integrate this information with their records in customer files and inventory files to produce reports.

2.1.2 PROBLEMS IN THE CURRENT SYSTEM.

1. The amount of customer and the inventory have become too large that the current number of employees are not able to handle.
2. The customers are not satisfied as the transactions in the manual system as they are very slow and sometimes are prone to errors.
3. The current system is very difficult to maintain and has high maintenance cost.
4. The clerks and other employees are not satisfied with the way they have to perform their tasks now. First off all, the customers are ever increasing and to look for their customer data files, during member service has become hectic. Furthermore, gathering information on inventory in hand, and manually by going through all the customers form and other forms has also become very hectic.
5. Stored data are not accurate due to human errors using the manual system.
6. The current system does not provide the management to have a better view of the activities of the car workshop.
7. Information flow between the management and the clerks are very slow. Information of sales are sent to the management only in a weekly basis. The management too, does not immediately update the clerks about purchases of new inventory.
8. The present system is very inflexible. It has very low responsiveness to change as the number of customers and other data are increasing rapidly.
9. The current system is not capable to support the future business plans of the management.
10. The current system is also insufficient in supporting the current business of the car workshop. For example, the current system does not have customer profiling where by the number of visits of the customers to the car workshop and facilities can be known. Furthermore, the current systems too do not provide sufficient monitoring of inventories. The car workshop too has to go through a lot of hassles when trying to find out everyday sales that occur in the sales center.
11. The current system does not provide competitive advantage to the car workshop. In fact, newer car workshops which have complete information systems in handling their business are emerging in Penang.

2.1.3 ECONOMIC FEASABILITY STUDY.

To study the economic feasibility of the project first, the tangible benefit, one time cost and recurring cost were calculated based on estimation. Assessing economical feasibility was done using Time Value of Method (TVM) taking into consideration of the future perspective of the money which being discounted (using Present Value method). The economic feasibility assessment was calculated for a period of five years.

Tangible Benefits.

The table below summarizes the tangible benefits to be gained from the project.

TANGIBLE BENEFIT WORKSHEET	
Impian Car Workshop System	
Year 1 through 5	
A. Cost reduction or avoidance	RM 10,000
B. Error reduction	5,000
C. Increased flexibility	3,000
D. Increased speed of activity	5,000
E. Improvement in management planning or control	8,000
F. Increase sales opportunities	<u>4,000</u>
TOTAL tangible benefits	RM 35,000

A. Application software

B. Incremental data of the system

(estimated cost)

C. Incremental cost of the system

D. Supplies

TOTAL recurring costs

One Time Costs

The table below summarizes the One Time Cost that will be incurred from the project.

ONE-TIME COSTS WORKSHEET	
Impian Car Workshop System	
	Year 0
A. Development Costs	RM 10,000
B. New hardware	20,000
C. New software	7,000
D. User training	2,000
E. Site preparation	<u>1,000</u>
TOTAL one-time cost	RM 30,000

Recurring Cost

The table below summarizes the Recurring Cost that will be incurred from the project.

RECURRING COSTS WORKSHEET	
Impian Car Workshop System	
	Year 1 through 5
A. Application software maintenance	RM 7,000
B. Incremental data storage required: 20MB * RM 50 (estimated cost / MB = RM 50)	1,000
C. Incremental communications	1,000
D. Supplies	<u>2,000</u>
TOTAL recurring costs	11,000

Intangible benefits.

Other than the tangible benefits, there are also a lot of intangible benefits that can be obtained from the project as stated below.

- 1. Provides more timely information such as customer history.
- 2. Makes it possible for faster decision making as there are more summerised and up to date information.
- 3. Improve processing efficiency.
- 4. Improve inventory control.
- 5. Increase accuracy in clerical operations.
- 6. Provides competitive necessity.

The following table presents the value calculation of all benefits and costs for the project based on the Net Present Value (NPV) and also the Break-even Analysis approaches.

The break even ratio is calculated using the formula :-
Break even ratio=(Yearly NPV Cash Flow-general NPV Cash Flow)/Yearly NPV Cash Flow

Value calculation of all benefits and costs for the project based on the Net Present Value (NPV) and also the Break-even Analysis approaches.

	Year of project						TOTALS
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	
Net economic benefit	0	35,000	35,000	35,000	35,000	35,000	
Discount rate (12%)	1	0.8929	0.7972	0.7118	0.6355	0.5674	
PV of benefits	0	31,252	27,902	24,913	22,243	19,859	
NPV of all BENEFITS	0	31,252	59,154	84,067	106,310	126,169	126,169
One-time COSTS	(39,000)						
Recurring Costs	0	(11,000)	(11,000)	(11,000)	(11,000)	(11,000)	

Discount rate (12%)	1	0.8929	0.7972	0.7118	0.6355	0.5674	
PV of Recurring Costs	0	(9,822)	(8,769)	(7,830)	(6,991)	(6,241)	
NPV of all COSTS	(39,000)	(48,822)	(57,591)	(65,421)	(72,712)	(78,653)	(78,653)
Overall NPV							47,516
Overall ROI (Overall all NPV / NPV of all COSTS)							0.6
Break-even Analysis							
Yearly NPV Cash Flow	(39,000)	24,130	19,133	17,083	15,252	13,618	
Overall NPV Cash Flow	(39,000)	(17,510)	(3437)	18,646	33,598	47,516	
Project break-even occurs between years 2 and 3							
Use first year of positive cash flow to calculate break-even fraction $[- (17,083 - 18,646) / 17,083] = 0.09$							
Actual Break-even occurs at 2.09 years							
Note: All ringgit values have been rounded to the nearest ringgit.							

From the table the break even ratio has been calculated to be at 2.09 years. From all the economic assessment, it has been summarized that the project is economically feasible.

2.1.4 OPERATIONAL FEASIBILITY STUDY.

The proposed system is predicted to solve current business problems and indirectly may introduce new business opportunities. The operational benefits of the proposed system are as follows: -

Improve customer service and customer satisfaction.

Customers can be registered online and immediately. Furthermore, the activities that involve customer such as reservation can be processed online and immediately. The new system too will allow the customer record to be up to date. Customers can be billed promptly and precisely. As such, it will reduce misunderstanding between management and the customers.

Eliminates the disadvantages of the previous conventional system.

Paperwork's will be reduce greatly and in the long run this might help in reducing the need for more employees in the future and reduce paperwork cost. Sneakernet that is the physically carrying of information from one computer to another will be eliminated. Thus, disadvantages of the manual system such as lost of data or files, incomplete data or data duplication can be reduced tremendously. Mainly, vast reduction in data processing time will help the organization in many aspects. The management and even the clerks can use the time for other beneficiary activities such as customer service and future planning.

Job satisfaction for end-users.

The new system will ease data access and reduce program maintenance for end users. It be very user friendly and can reduce many of end users manual tasks. Jobs will be simplified for the clerks and management can acquire data more easily, securely and fast. The clerks will not have to go through the hassle of looking for specific sale item, rental item or inventory manually and search for customers records the manual way. By using the new system too, the clerks will feel more secure as less errors can be made by them. For the management, the new system will tremendously ease the job of producing reports.

Provides good management view.

The new database system will provide good management view of the s club. Management personals will be able to collect important data for management planning, keep track of customer status. The new system will provide a wide variety of reports with ease and this reports will be very useful for the management. Furthermore, the management too can monitor the activities of the clerks.

Improved data flow and data sharing.

The proposed system network will allow the operations of the car workshop system to be centrally managed, standardised and consistent. First of all, there will be information and data accuracy because of standardised data capture and data sharing procedures. Thus, data errors will be reduced, data will be very up to date and this will result in much reduced conflicts between the management and the clerks. Secondly, there will be information usability, which is sending and retrieving specific information and data tailored to specific need of information of management and clerks. Thirdly information accessibility will be made easy. Systems end users will find it more easier to retrieve task specific information's from different sources.

The new system also can supply the management information needed to make future plans and decision such as budgeting, resource allocation.

Better inventory management and control.

The new system will allow better management of service and workshop inventories for the clerks and management. They can add items to the inventory online and faster, check for sold units. Furthermore, the clerks can keep better track of amount of inventories in stock and ordering process from the suppliers will be smoother and more efficient.

More reliable.

The new system will be more reliable as it will provide more accurate data and reports that the centre needs. The new system too will ensure trouble free operations and increased speed of transactions. In conclusion, it is predicted that the proposed system will be a very low risk project in terms of operational feasibility and. will solve current business problems of the video centre such as long and tedious data processing procedure, data errors and etc.

2.1.5 TECHNICAL FEASIBILITY STUDY.

The technical feasibility of the proposed project was conducted as in the categories below :-

Project size and complexity.

The proposed project is considered to be a medium-low sized project undertaking since it involves creating a new network to the entire centre. The project is forecasted to be completed in 22 weeks time with only one person directly involved in the project plus indirect involvement of employees of the car workshop. The project also involves a lot of programming effort. First of all, a new and complete application programming using available software applications for the entire workshop must be done. Then, specific programming in accordance to specific application needs of the management, clerks and customers must be done. Although there is only one person working on the project but the duration which is 22 weeks is quite long. Such constraints make the project large and complex and it can be considered that risks are high in terms of project size and complexity.

Project structure.

The proposed project will be a new system to the car workshop, which is a database approach where data is centrally managed, standardised, consistent and available to multiple users in the workshop. The data processing procedures will change in the new system but it will be much improved and for the better. Furthermore, requirements for the new system are easily obtained and very highly structured since its involves a medium sized organisation most of the information systems needs are formal.

The end users, which include the management level personals and the clerks, are very committed to the project, as a very improved database network system is needed to solve current problems. Collaboration and end users views and needs will be given high priority. Thus, the risks regarding project structure is low.

Development persons knowledge.

The development person is very familiar with the hardware, software applications, tools and operating systems that will be used in the new system. As such, the hardware components will be standard microcomputers or PCs for the end users and a central workstation computer with a powerful server CPU, for the network administrator. Windows 98 operating software will be used

for the central computer while the end users microcomputer will be running on Windows 98 operating software. The Windows NT operating system is very easy to use and there are many applications software and technical support available for this operating software. The software applications and programming language that will be used are very popular and common Windows based softwares such as Visual basic, and MS Access. The development person is also very familiar with activities, procedures and information needs of the proposed application area.

In terms of project structure, risks are predicted to be very low because the hardware, operating systems and application softwares are commonly used and standard technology. The proposed technology are matured enough to be applied to the problems. Furthermore, the development person is very familiar with the target systems components and application area.

User group.

Some of the aspects and application in the proposed system will be new to some of the end users especially the clerks and machnics as the they have to divert from the previous manual system to the fully computerised system. Although it may be new but training the end users will be very easy as the new systems uses Windows operating software and Windows based application software which are very easy to learn. Computerised application tasks also wouldn't be very different than the previous system

In conclusion, it is predicted that the project will be a medium-low risk project in terms of technical feasibility, even though it is a large project, as the development person is highly familiar with technology and application area, use of standard technology, highly structured and end users familiarity with the new system.

2.1.6 MANAGEMENT OF THE PROJECT.

PROJECT SCHEDULLING.

The owner of Impian car workshop , require that the new system should be fully operational by beginning of March 2003. Thus, an agreement has been reached with owner that the entire project should be completed somewhere in the middle of October 2003 so that there will be a time space in between for the end users to get used to the new system. The starting date of the project has been set on the 17th of January 2003.

The main phases of the systems development life cycle and their duration are shown below:-

Phases.	Duration.
Requirement Determination	1 week
Requirement Structuring	5 weeks
Screen Design	2 weeks
Report Design	2 weeks
Database Design	2 weeks
Physical Design	1 week
User Documentation	1 week
Programming	5 weeks
Testing	2 weeks
Installation	3 weeks
Training	1 weeks

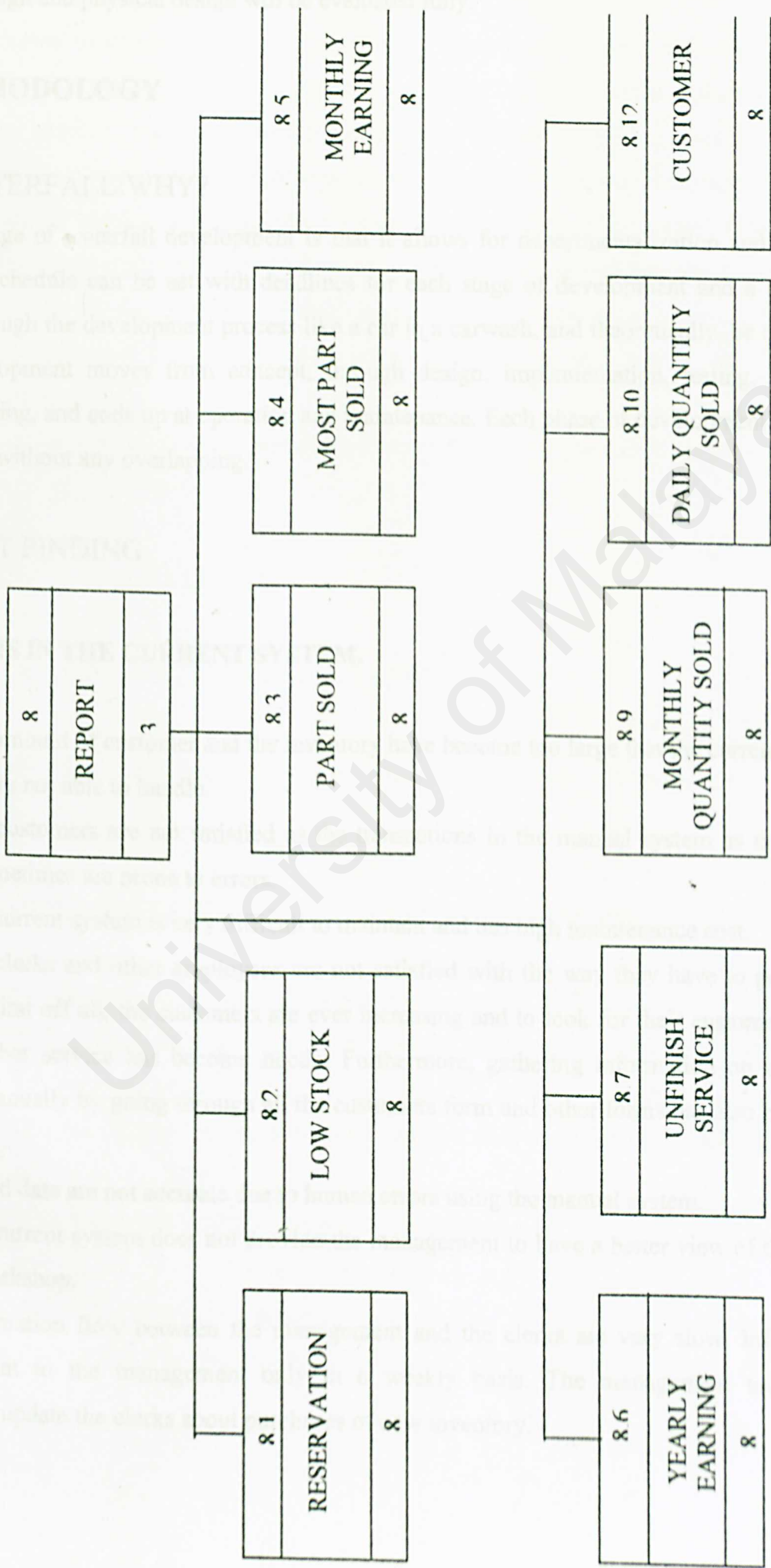
The scheduling of the project has been done using two methods. One is using the Gantt chart method and the other is by using the PERT chart method. Both the Gantt chart and the PERT chart are presented in the following pages.

The Gantt chart shows all the phases of the development cycle, their duration, the predecessors of each phase and the linkage between all the phases. The PERT chart presents all the interdependencies among the phases. Through the scheduling, it has been determined that the end date of the project is on 25th of March 2003 and the owner is satisfied with it.

Communication Plan.

All the owner and the employees of the Impian car workshop system will be indirectly involved in the development of the new system. First of all, for requirement determination, all of them will be approached for their ideas and views on requirements of the new system. The progress of screen design and report design phase will shared with all the employees and the owner. Their consideration and feedback regarding their deliverables of the two phases will be evaluated. Furthermore, for the training and testing phases, all the end users will be directly involved. The progress of the project will be constantly discussed with the owner. The feedback and

8.0 REPORT



considerations of the owner, especially of the deliverables of the phases requirement structuring, database design and physical design will be evaluated fully.

3.0 METHODOLOGY

3.1.1 WATERFALL: WHY?

The advantage of waterfall development is that it allows for departmentalization and managerial control. A schedule can be set with deadlines for each stage of development and a product can proceed through the development process like a car in a carwash, and theoretically, be delivered on time. Development moves from concept, through design, implementation, testing, installation, troubleshooting, and ends up at operation and maintenance. Each phase of development proceeds in strict order, without any overlapping.

3.1.2 FACT FINDING

PROBLEMS IN THE CURRENT SYSTEM.

12. The amount of customer and the inventory have become too large that the current number of employees are not able to handle.
13. The customers are not satisfied as the transactions in the manual system as they are very slow and sometimes are prone to errors.
14. The current system is very difficult to maintain and has high maintenance cost.
15. The clerks and other employees are not satisfied with the way they have to perform their tasks now. First off all, the customers are ever increasing and to look for their customer data files, during member service has become hectic. Furthermore, gathering information on inventory in hand, and manually by going through all the customers form and other forms has also become very hectic.
16. Stored data are not accurate due to human errors using the manual system.
17. The current system does not provide the management to have a better view of the activities of the car workshop.
18. Information flow between the management and the clerks are very slow. Information of sales are sent to the management only in a weekly basis. The management too, does not immediately update the clerks about purchases of new inventory.

19. The present system is very inflexible. It has very low responsiveness to change as the number of customers and other data are increasing rapidly.
20. The current system is not capable to support the future business plans of the management.
21. The current system is also insufficient in supporting the current business of the car workshop. For example, the current system does not have customer profiling where by the number of visits of the customers to the car workshop and facilities can be known. Furthermore, the current systems too do not provide sufficient monitoring of inventories. The car workshop too has to go through a lot of hassles when trying to find out everyday sales that occur in the sales center.
22. The current system does not provide competitive advantage to the car workshop. In fact, newer car workshops which have complete information systems in handling their business are emerging in Penang.

The current systems level 0 – data flow diagram is shown in the following page.

4.0 NEW SYSTEM ANALYSIS.

4.1.1 DETERMINING SYSTEM REQUIREMENTS.

The following ways and methods have been used to determine the requirements for the new system: -

A group interview with the club's management (Owner and management staffs).

Purpose : To determine the managements interest and commitment to the proposed system, determine financial constraints that might arise, determine new systems capabilities and limits, determine requirements for the new systems on the whole, standard and level of technology and software application to be used and determine overall view of the head towards the proposed system.

An interview with the clerks and other lower level employees.

Purpose : To determine the views of the clerks in developing the new system, the computer knowledge they have and the new systems features that the clerks would like to have in the new system in order

to carry out their tasks like selling sales items, booking facilities for customers and etc. This will help in design very user friendly screens for the clerks and mechanics to use and fast to learn.

An interview with the car workshop customers.

Purpose :

To determine the views of the customers regarding any difficulties and hassles that they face when using the car workshop facilities and services currently and also to determine the new systems features that the customers would like to have that would make the car workshop serve them better.

Observation and study current systems procedure manuals and documents.

Purpose :

To have a much clearer understanding of the main business processes of the workshop, the way the information flows in the car workshop and what are the rules and procedures that governs this information flows.

4.1.2 FINDINGS OF THE STUDIES AND NEW SYSTEMS REQUIREMENTS STRUCTURING.

Below are the main requirement specifications that have been derived from all the studies that have been conducted.

1. The management were very interested and committed in the proposed project as it is needed to solve the current problems of the organization.
2. However, the proposed financial budget for the project is budgeted at \$30,000 for one time cost and \$15,000 for recurring cost by the management.
3. The project is expected to be fully operational by the first of March 2003.
4. As most of the management staff and employee of car workshop only have minimal or average knowledge in computing, the use of type of technology and software is expected to be very standard and up to the level of the employees of the store.
5. The technology and application too should be powerful enough to handle the amount of data of the car workshop, easy to be maintained by the car workshop and they should be very flexible to upgrade and change.

6. The new system should be able to be accessed by many employees of the car workshop in many different departments and facilities. There should be network security where the access and operation of employees on the system can be monitored and traced.
7. The new system should be very flexible, upgradeable and scalable to support future business plans and also future information systems plan.
8. The new system too should be easy for the car workshop to maintain and perform troubleshooting in times or errors.

Requirements specifications for customer maintenance.

1. There should be a proper database record for all the customers , where it is easy for the employees to update, edit, delete and search for customers record. Customers should be identified by two keys which are name customer ID. The system should also allow customer profiling whereby customers visits, bookings and services in the car workshop are recorded.
2. All customers service reservation should be able book online.
3. The reports that are needed in this section are :-
 - ❖ Customers information.
 - ❖ Payment by customers.
 - ❖ Service reservation manual and online.
 - ❖ Unfinished service.

Requirements specifications for sales management.

1. Database records of all suppliers and parts sales inventory are needed and also for all the parts on sale.
2. All sales (service) should be done online. The payment of bills should be able to be credited to the customers.
3. The reports that are required in this section are:-
 - ❖ Daily, monthly and yearly sales report.
 - ❖ Daily and monthly quantity sold.
 - ❖ Low parts stock.
 - ❖ Parts quantity stock
 - ❖ Order

Requirement specifications for resource maintenance.

1. Database records of all employees and suppliers are needed.
2. A simple feature for the employees to record ordering of inventory from suppliers and also a feature for recording receiving inventory supplies from suppliers is needed.
3. The reports that are needed in this section are :-
 - ❖ Orders by Date.
 - ❖ Unreceived, fully received or partially received orders.

The new systems context diagram and level-0 dataflow diagram have been made using the gathered information or requirements and they are shown in the following pages.

4.1.3 NON-FUNCTIONAL

Attributes identified by Quality Factors:

- **Functionality**
- **Reliability**
- **Usability**
- **Efficiency**
- **Maintainability**

User friendly to all level of users in an organization

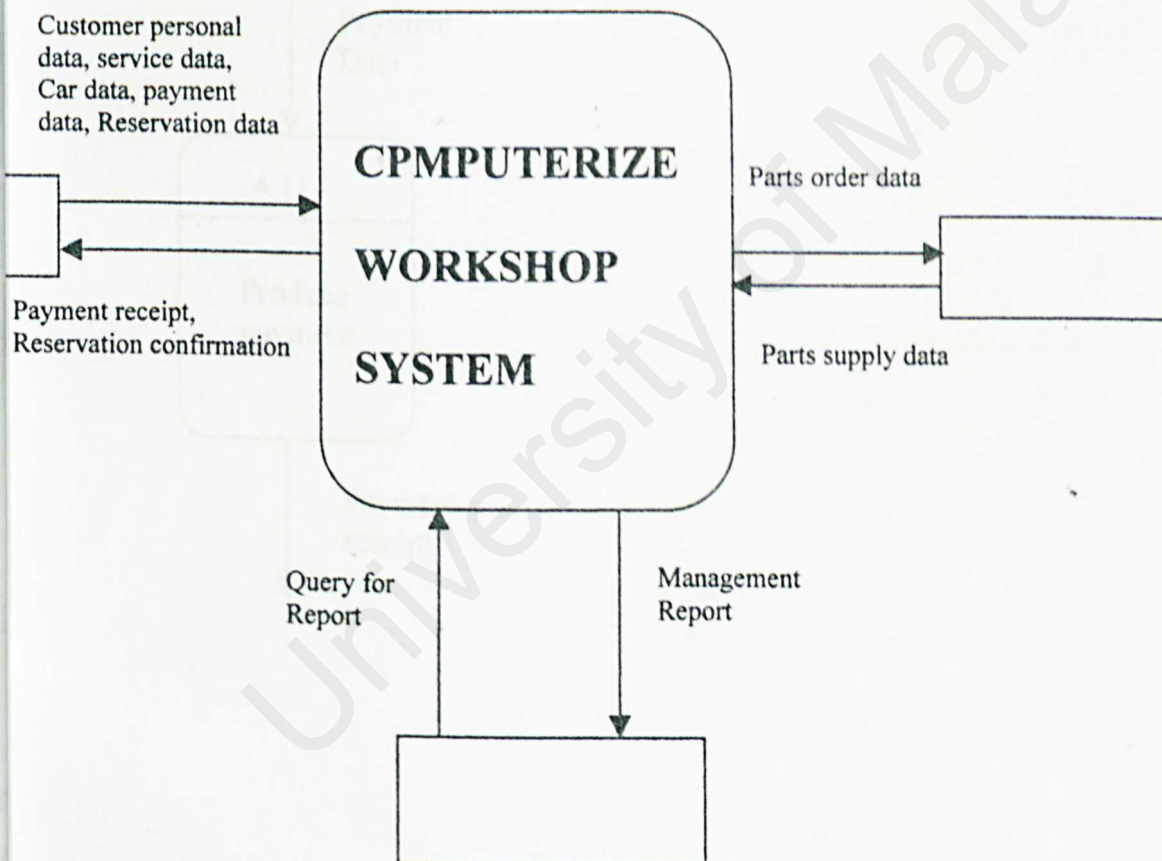
4.1.4 SELECTION AND ACQUISITION OF HARDWARE AND SOFTWARE

This program will be basis for developing a networked system for the workshop. The current program will required a Pentium II PC with Microsoft Window 98 operating software or above. Thus, the hardware needs on the basic Pentium PC at least Pentium II processor and a workstation PC for networks with at least with Pentium II processor. All the PC's should have at least Pentium 4MB RAM memory or more. The hard disk space required for program are 4 MB and the disk should be at least 80MB memory.

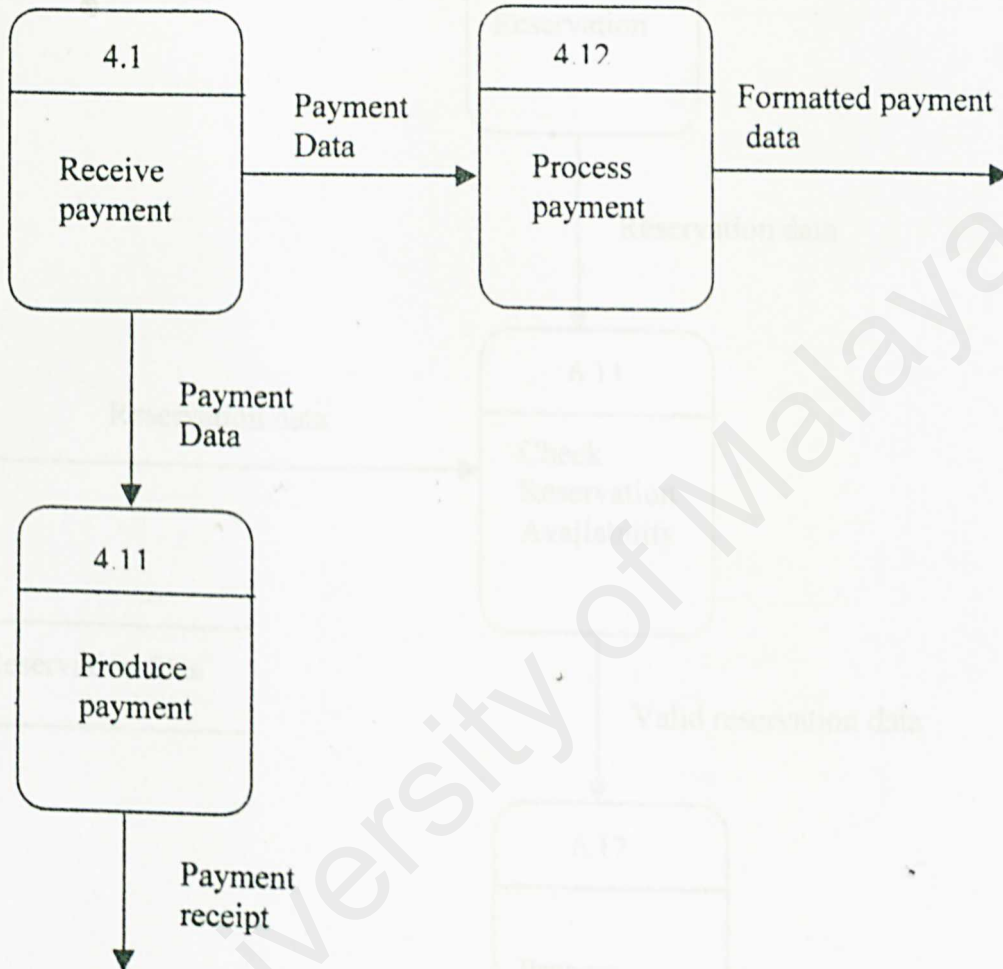
The server will be using Windows NT operating software and the clients will be using Windows 98 operating software. The workstation PC must have 32 MB hard disk space for Windows NT installation. The software needed for the system application are Visual Basic as front

end and Microsoft Access Database as a back end. The choice of using Microsoft Visual Basic was based on its performance, productivity, scalability, user interface design (GUI), data access flexibility, rich set of standard controls and the development persons skills in that application. This product will allow to reliably design writes code and debugs less code and builds production quality application within schedule and budget constraints to implement the system.

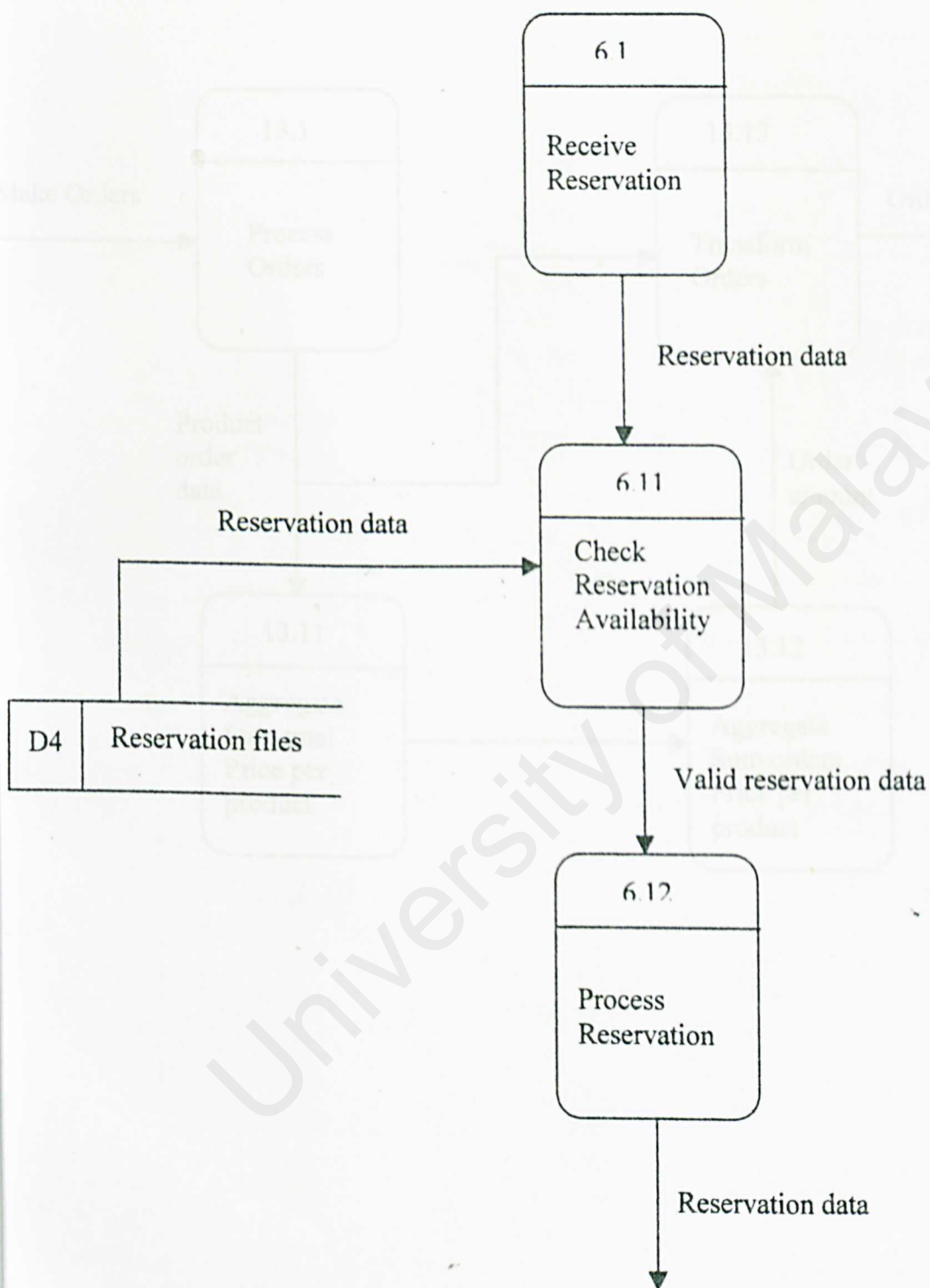
CONTEXT DIAGRAM



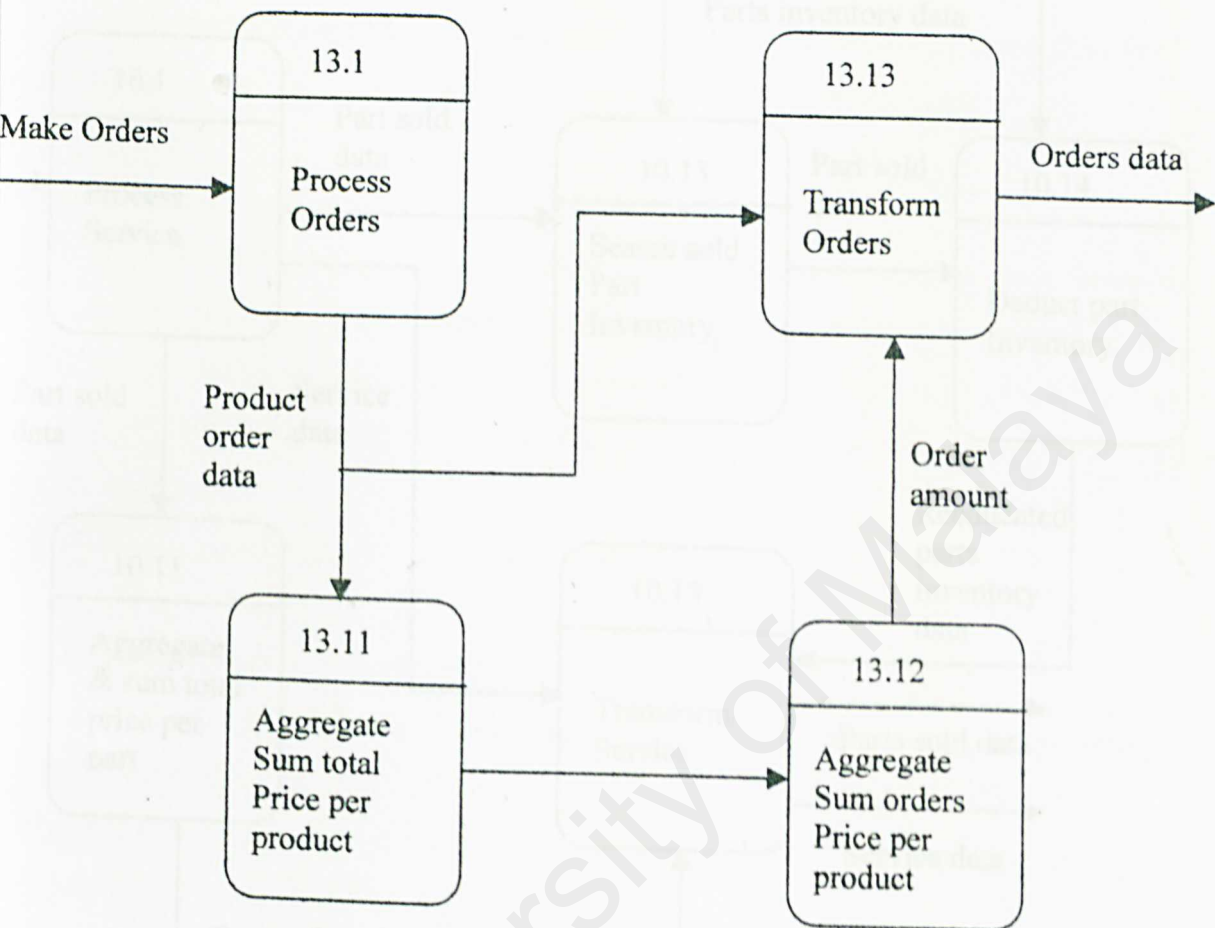
1. PAYMENT PROCESS

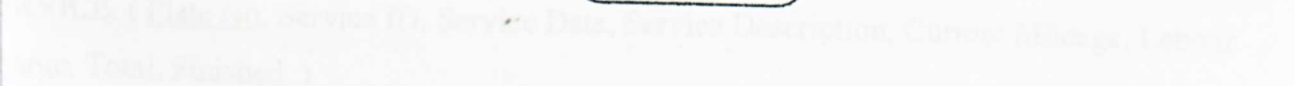


.RESERVATION INSFORM ORDERS



3.PROCESS & TRANSFORM ORDERS





5.0 SYSTEM DESIGN

5.1.1 DATABASE DESIGN

NORMALIZATION

All the attributes for all the entities from the entity relationship are in the their third normal form. All the entities will now have been presented in forms of relationship with the others entities.

Relationship between entities CUSTOMER and PAYMENT

The relationship between CUSTOMER with PAYMENT are one to many relationship. Many payment made by each customer. PAYMENT is a weak entity which dependent on CUSTOMER. Their relationship can be shown by adding the primary key of MEMBER as foreign keys in PAYMENT. As such the entity PAYMENT will now have structure as below. (All primary keys are underlined)
PAYMENT. (Customer ID, Date, Amount, Notes)

Relationship between entities CUSTOMER and CARS

The relationship between CUSTOMER with CARS are one to many relationship. Many can own by each customer. Their relationship can be shown by adding the primary key of CUSTOMER as foreign keys in CARS. As such the entity CARS will now have structure as below. All primary keys are underlined)
CARS. (Customer ID, Plate No, Type, Year, Mileage, Last Service)

Relationship between entities CARS and SERVICE

The relationship between CARS with SERVICE are one to many relationship. Many services can be done for a car. Their relationship can be shown by adding the primary key of CARS as foreign keys in SERVICE. As such the entity SERVICE will now have structure as below. (All primary keys are underlined)
SERVICE. (Plate No, Service ID, Service Date, Service Description, Current Mileage, Labour charge, Total, Finished)

Relationship between entities SERVICE and EMPLOYEE

The relationship between SERVICES with EMPLOYEE are one to many relationship. Many service made by each employee. Their relationship can be shown by adding the primary key of SERVICE as foreign keys in EMPLOYEE. As such the entity EMPLOYEE will now have structure as below. (All primary keys are underlined)

EMPLOYEE. (Employee ID, Name, IC No, Job Title, Date Joined, Salary, Address, Telephone No, Notes)

Relationship between entities EMPLOYEE and ORDER

The relationship between EMPLOYEE with ORDER are one to many relationship. Many orders made by each employee. Their relationship can be shown by adding the primary key of EMPLOYEE as foreign keys in ORDER. As such the entity ORDER will now have structure as below. (All primary keys are underlined)

ORDER. (Order ID, Date, Received, Last date Received, Total, Employee ID, Supplier ID)

Relationship between entities ORDER and SUPPLIER

The relationship between ORDER with SUPPLIER are one to many relationship. Many order made by each supplier. Their relationship can be shown by adding the primary key of ORDER as foreign keys in SUPPLIER. As such the entity SUPPLIER will now have structure as below. (All primary keys are underlined)

SUPPLIER. (Supplier ID, Name, Address, Contact Person, Contact Person Title, Telephone No, Fax, Notes)

Relationship between entities SUPPLIER and PARTS

The relationship between SUPPLIER with PARTS are one to many relationship. Many parts supplied by each customer. Their relationship can be shown by adding the primary key of SUPPLIER as foreign keys in PARTS. As such the entity PARTS will now have structure as below. All primary keys are underlined)

PARTS. (Parts No, Name, Quantity, Brand, Price, Supplier ID, Notes)

Relationship between entities CUSTOMER and RESERVATION

The relationship between CUSTOMER with RESERVATION are one to many relationship. Many reservation made by each customer. RESERVATION is a weak entity which dependent on CUSTOMER. Their relationship can be shown by adding the primary key of CUSTOMER as foreign keys in RESERVATION. As such the entity RESERVATION will now have structure as below. (All primary keys are underlined)
RESERVATION. (Customer ID, Date, Reservation Date, Time, Customer ID)

Relationship between entities EMPLOYEE and PAYMENT

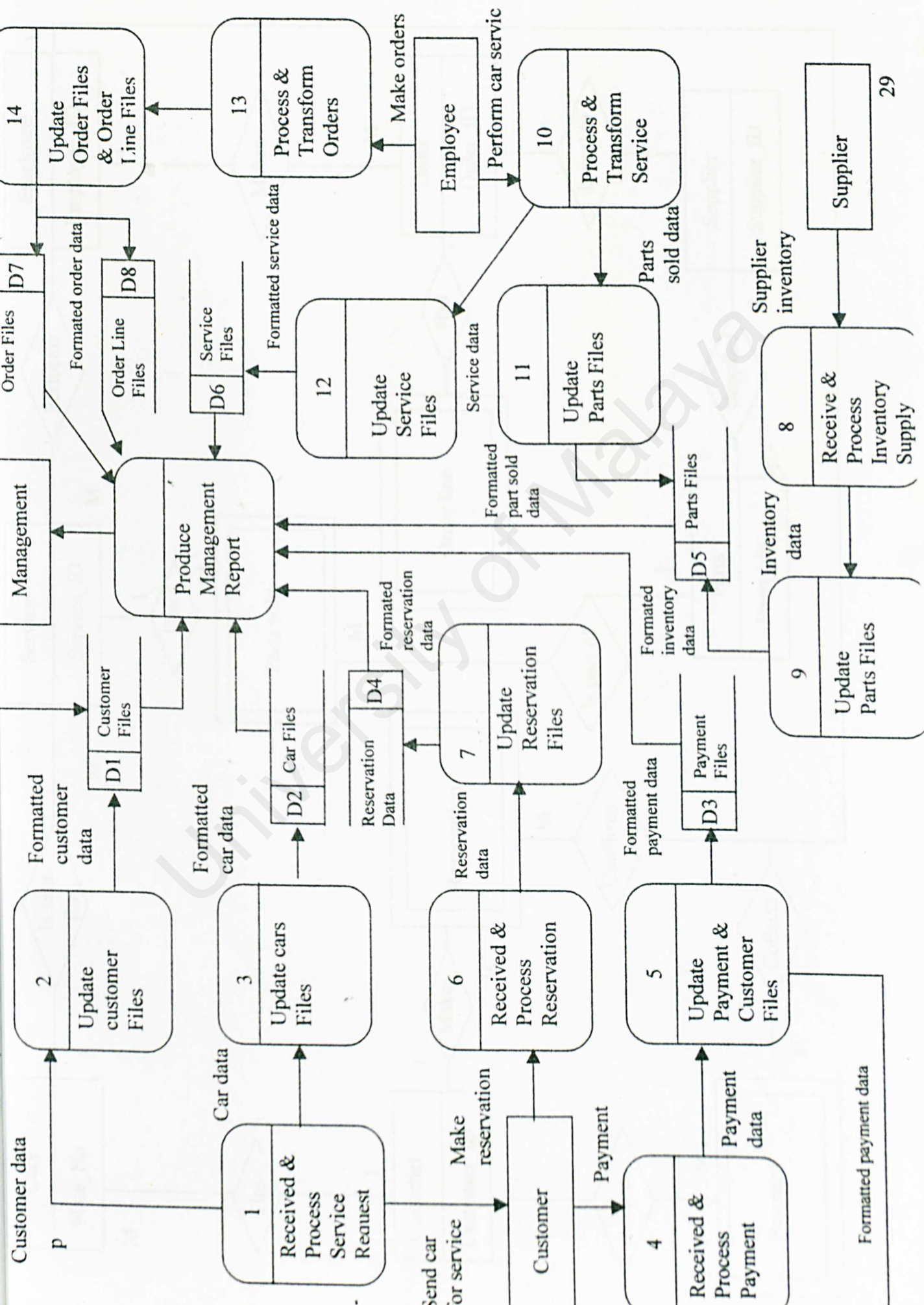
The relationship between EMPLOYEE with PAYMENT are one to many relationship. Many payment made by each customer. PAYMENT is a weak entity which dependent on CUSTOMER. Their relationship can be shown by adding the primary key of CUSTOMER as foreign keys in PAYMENT. As such the entity PAYMENT will now have structure as below. (All primary keys are underlined)
PAYMENT. (Customer ID, Date, Amount, Notes)

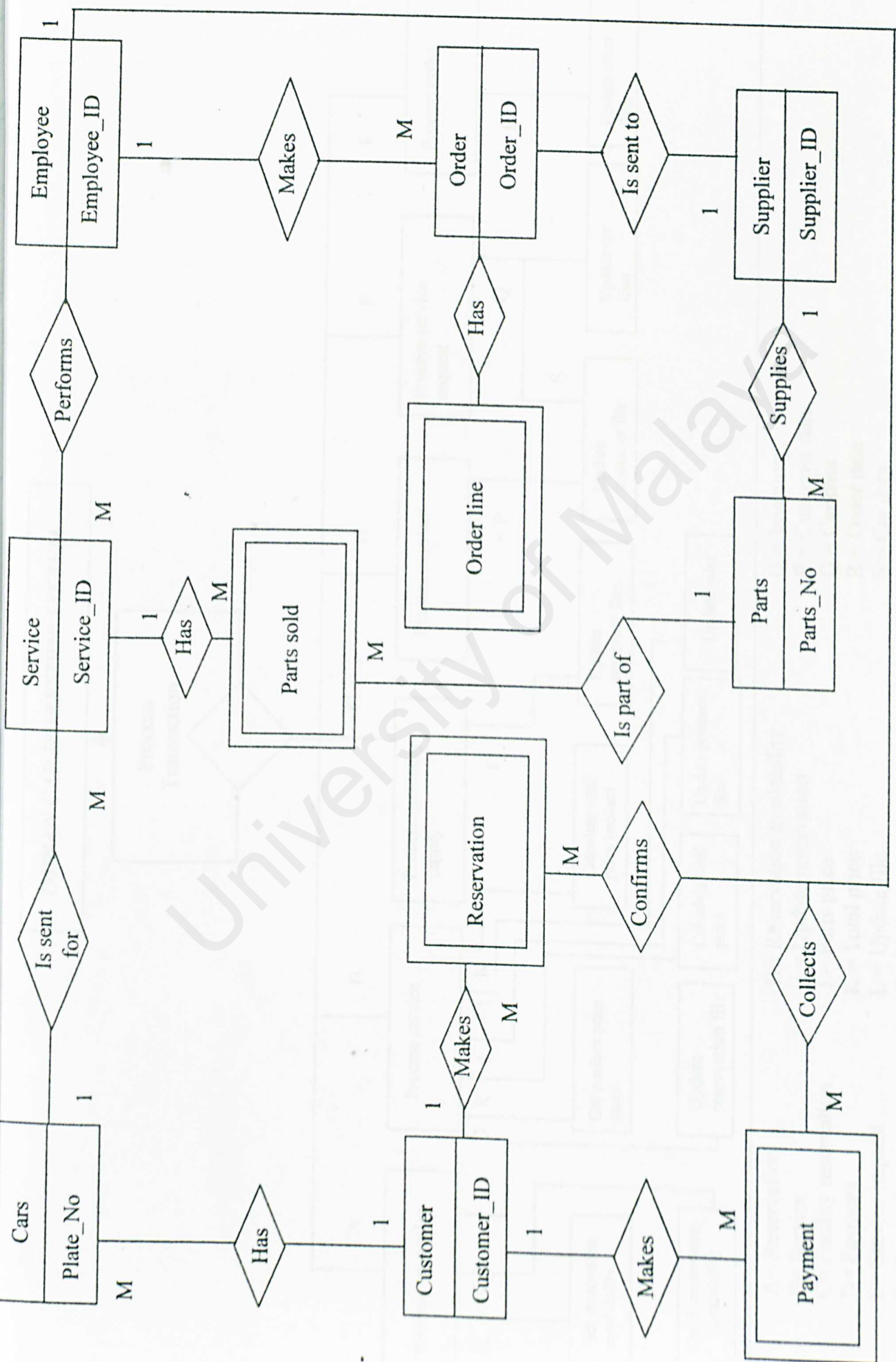
Relationship between entities EMPLOYEE and REVERSATION

The relationship between EMPLOYEE with REVERSATION are one to many relationship. Many reservation made by each employee. RESERVATION is a weak entity which dependent on EMPLOYEE. Their relationship can be shown by adding the primary key of EMPLOYEE as foreign keys in RESERVATION. As such the entity RESERVATION will now have structure as below. (All primary keys are underlined)
RESERVATION. (Customer ID, Date, Reservation Date, Time, Customer ID)

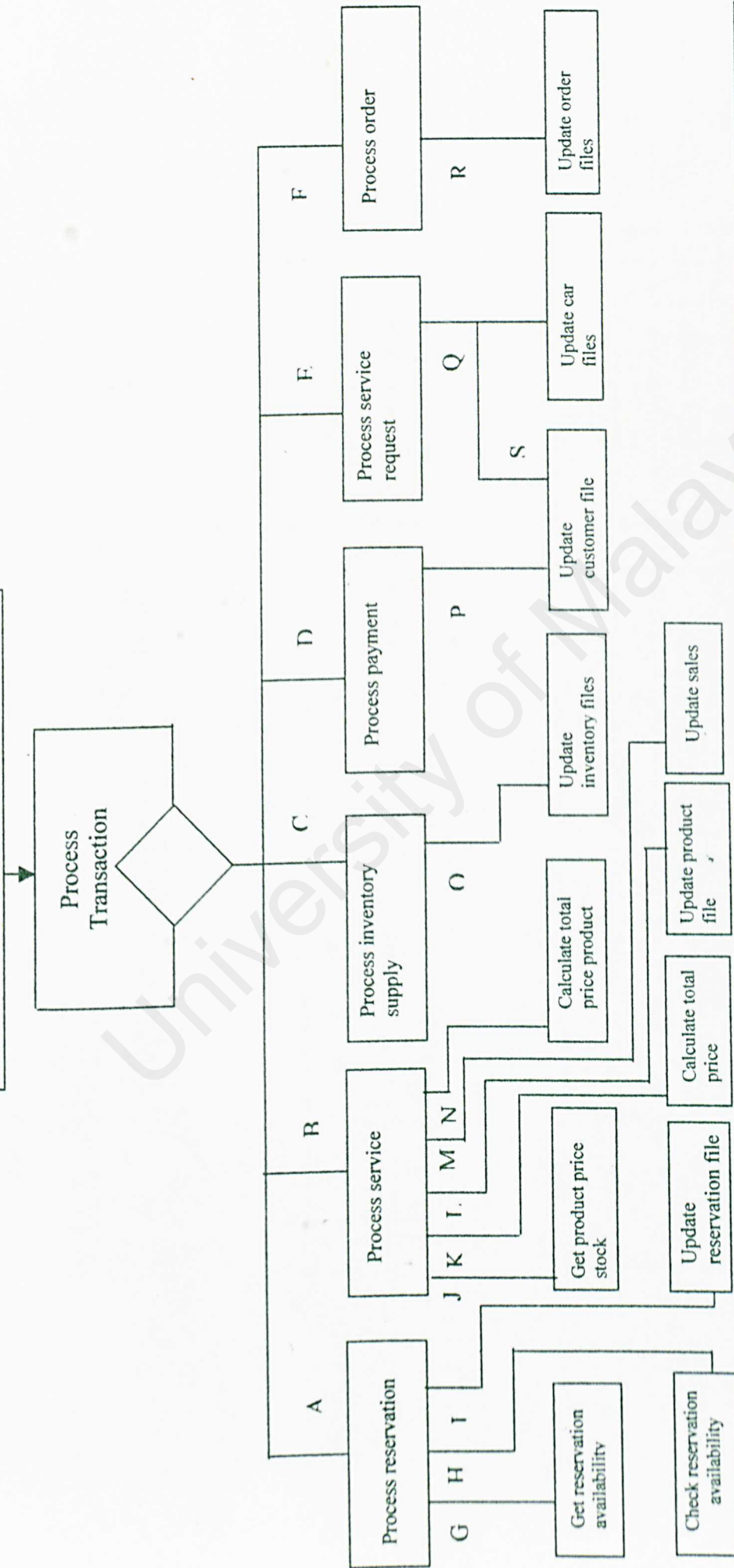
Relationship between entities SERVICE , PART SOLD and PARTS

The relationship between SERVICE with PART SOLD are one to many relationship. Many part sold during service. PART SOLD is a weak entity which dependent on SERVICE and PARTS. Their relationship can be shown by adding the primary key of SERVICE and PARTS as foreign keys in PART SOLD. As such the entity PART SOLD will now have structure as below. (All primary keys are underlined)
PART SOLD. (Part No, Quantity, Total Price, Service ID)



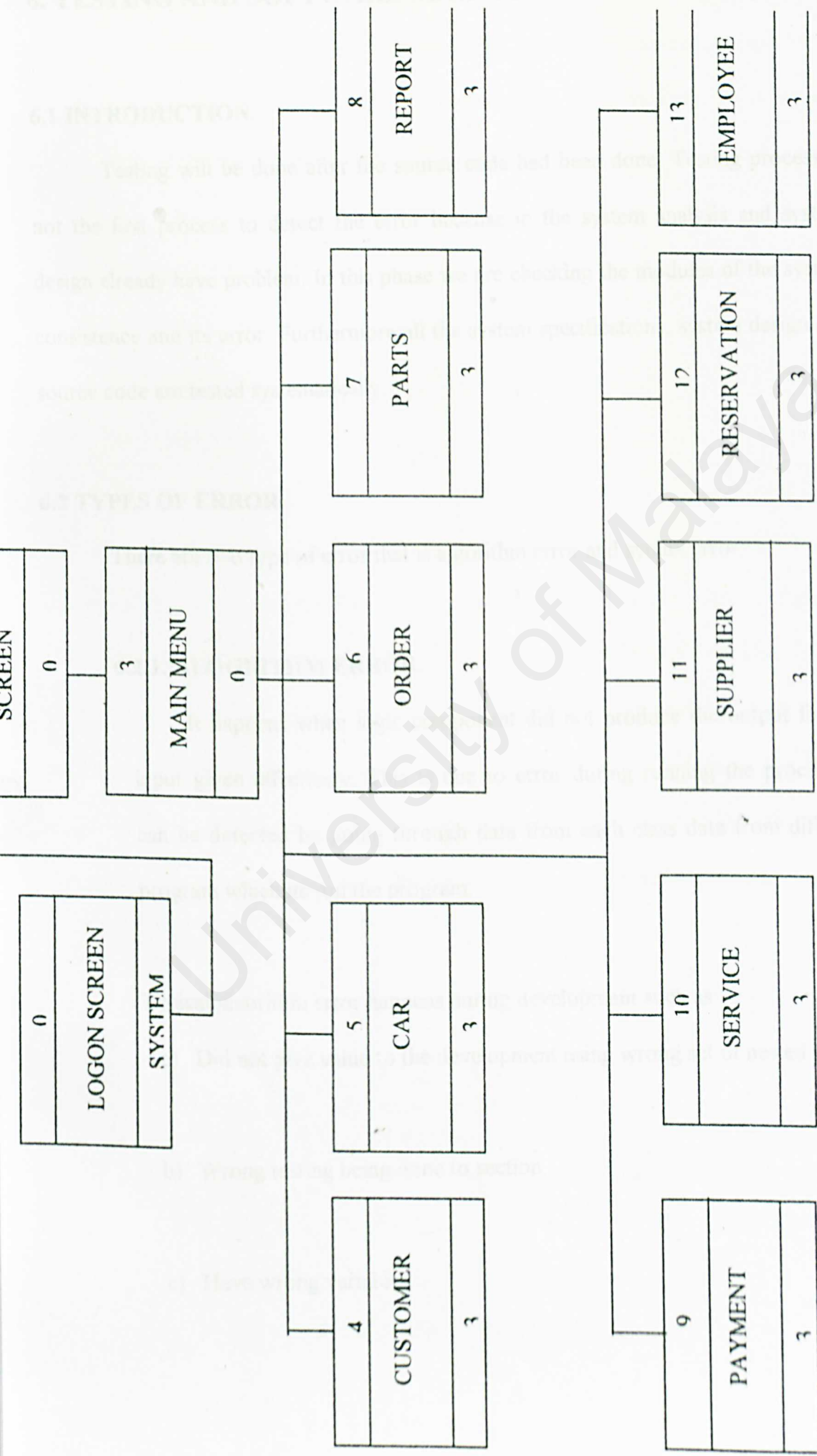


IMPIAN CAR WORKSHOP SYSTEM



G= Reservation data

N = Calculate total product price



6. TESTING AND SOFTWARE MAINTENANCE.

6.1 INTRODUCTION.

Testing will be done after the source code had been done. Testing process is not the first process to detect the error because in the system analysis and system design already have problem. In this phase we are checking the modules of the system consistence and its error. Furthermore all the system specifications, system design and source code are tested systematically.

6.2 TYPES OF ERROR.

There are two type of error that is algorithm error and syntax error.

6.2.1. ALOGRITHM ERROR.

It happens when logic component did not produce the output for the input given effectively. This is due to error during running the process. It can be detected by going through data from each class data from different program which its run the program.

Typical algorithm error happens during development such as:

- a) Did not give value to the development using wrong set of nested loops.
- b) Wrong testing being done to section.
- c) Have wrong variables.

6.2.2 SYNTAX ERROR.

Syntax error happens due to using wrong programming languages or miss use the function. This can be eliminated by using front page because most of the codes are developed by using it.

6.3 TYPE OF TESTING.

There are three main type of testing which are:

- a) Unit Testing.
- b) Integration Testing.
- c) System Testing.

The unit and integration testing was done to verify whether source code is implemented well in the system design. Both testing includes system component testing that were done by individual and checked by interface user. While the system testing is done at the end of system build and verified whether the system have achieved the objective or scope of the system. The figure below shows the testing activities flow. The arrow indicates the stages of each testing. In case of any difficulties arises during the testing the process cycle must be repeated again.

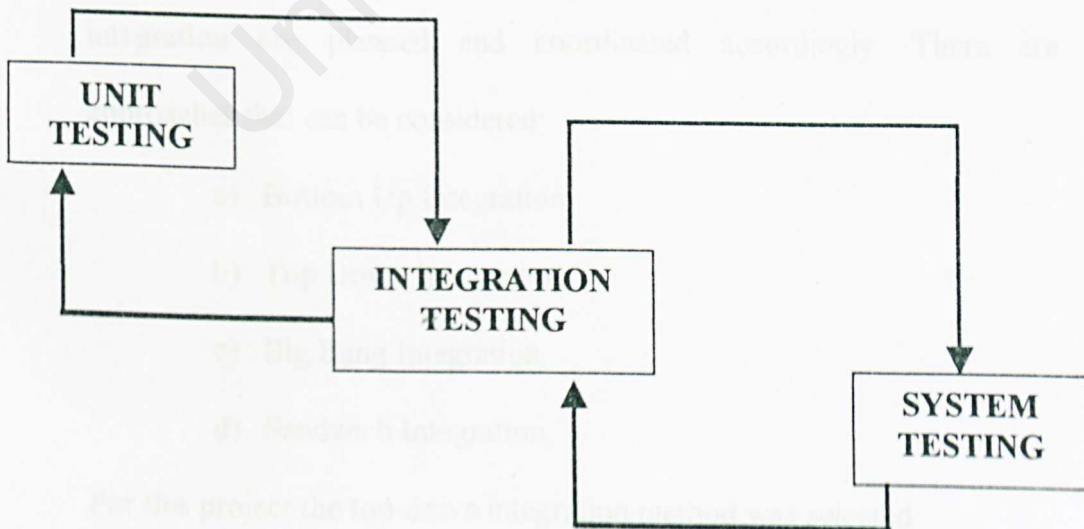


Figure 6.1 Testing Stages.

6.3.1 UNIT TESTING

The testing unit will identify the smallest component for design application in the module. This will determine the marginal error resulting from source code and logical error. In this system the testing was conducted during the coding phase, which involves three main stages.

1) **Initial Stage – Code Inspection.**

Process involves program code inspection to distinguish algorithm error and syntax error.

2) **Second Stage- Coding Compilation.**

Code compilation process and elimination of remaining syntax errors.

3) **Final Stage – Test Case Development.**

Developing test case to compare the input and output data for synchronization.

6.3.2. INTEGRATION TESTING.

A systematic approach to develop program structure and at the same time identify existence of error from the interface. A failure can be detected if integration are planned and coordinated accordingly. There are few approaches that can be considered:

- a) Bottom Up Integration.
- b) Top Down Integration
- c) Big Bang Integration.
- d) Sandwich Integration.

For this project the top-down integration method was selected.

6.3.2.1 TOP DOWN INTEGRATION.

A system is described as a hierarchy that consists of few components, where components are placed in one specify layer as shown in the figure below.

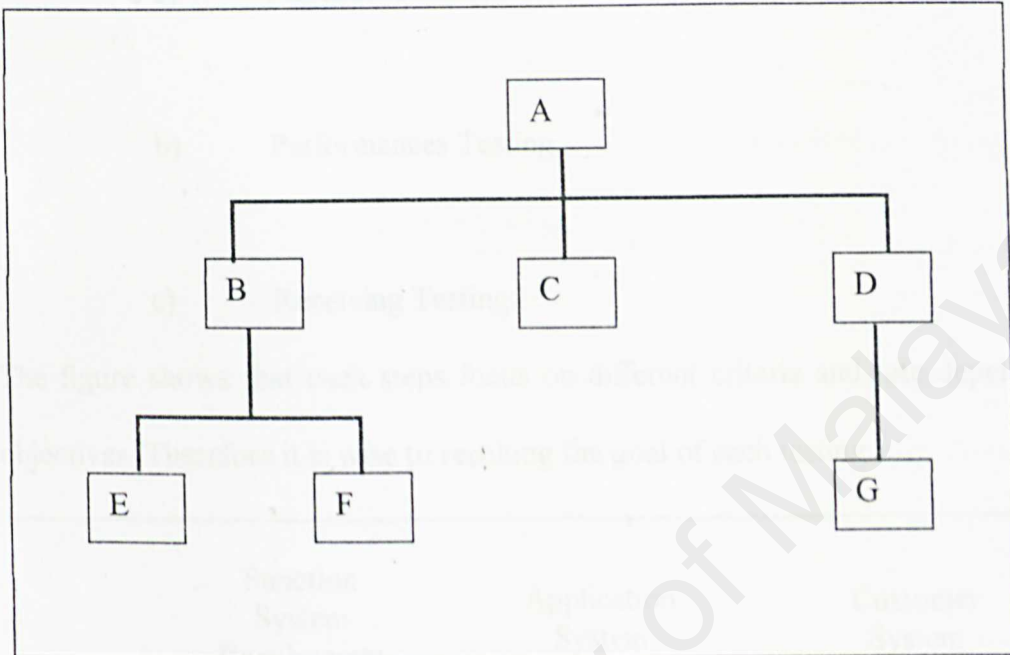


Figure 6.2. Hierarchy Component Example.

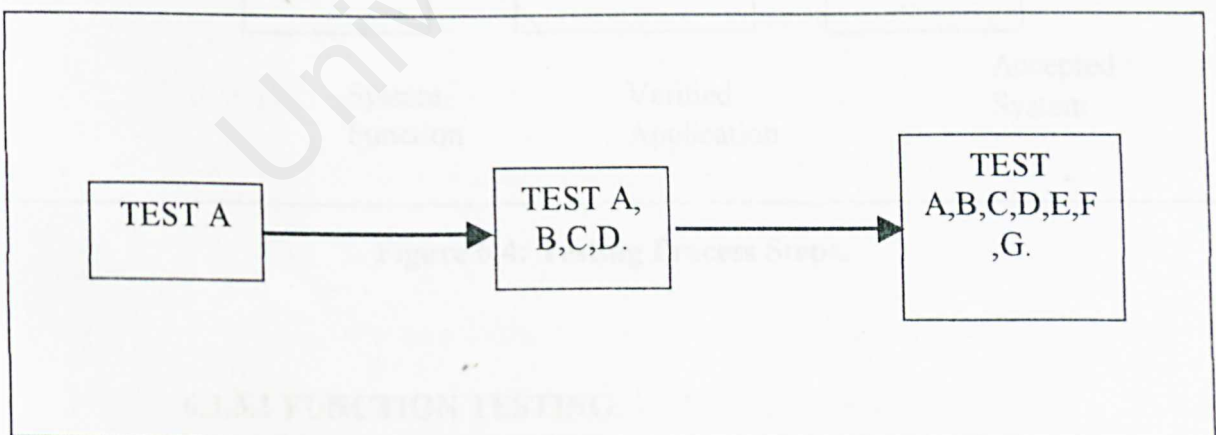


Figure 6.3. Top-Down Approach.

6.3.3 SYSTEM TESTING.

Final phase of testing process after completion of each module coding to ensure that the modules are function properly and meets the system requirements. Three main steps for system testing:

- a) Function Testing.
- b) Performances Testing.
- c) Receiving Testing.

The figure shows that each steps focus on different criteria and rate depends on it objectives. Therefore it is wise to resulting the goal of each testing.

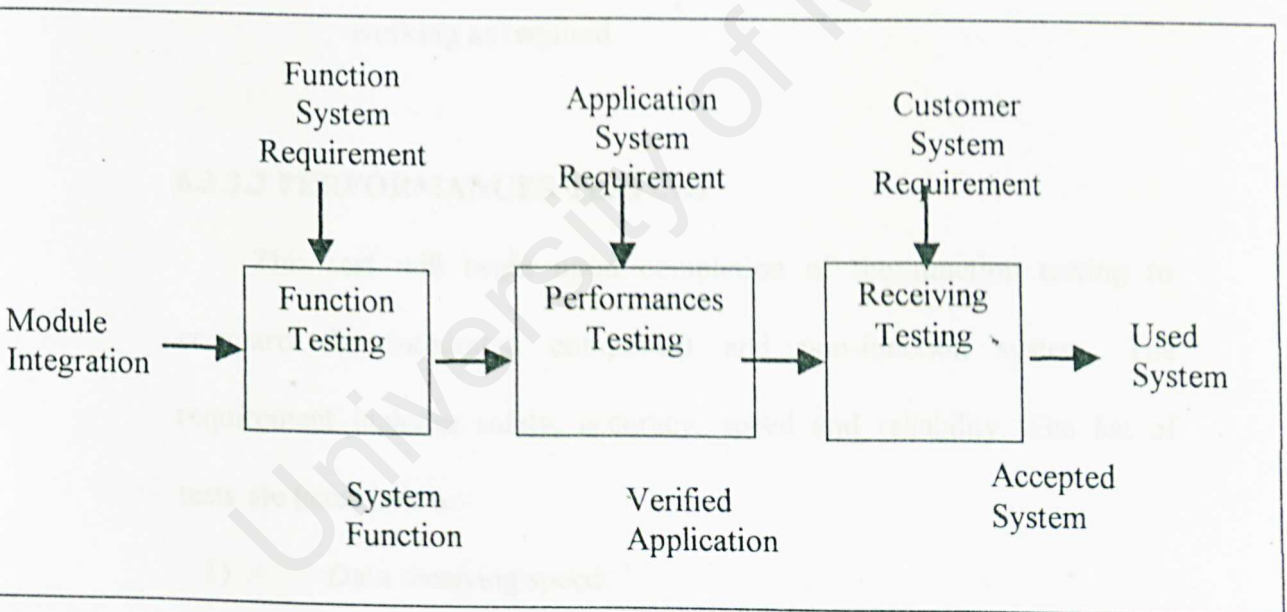


Figure 6.4: Testing Process Steps.

6.3.3.1 FUNCTION TESTING.

This testing is to clarify whether the system requirement had been met or not. Below are some of the test function modules implemented for the "Computerized Car Workshop":

1). Information Module

- Make sure the information display is accurate when icon had been pressed.
- Continue testing to clarify whether the system is running smoothly.

2). Customer Support Module.

- Ensure that user receive the correct information or suggestion for each problem highlighted.

3) Administration Module.

- Ensure that all function in the system such as data input, processing, maintenance, data delete and configuration are working as required.

6.3.3.2 PERFORMANCES TESTING.

This test will begin upon completion of the function testing to compare the integrated component and non-function system. The requirement includes safety, accuracy, speed and reliability. The list of tests are listed below:

- 1) Data receiving speed.
- 2) Ability to produce consistent data.
- 3) Accuracy in the data function and process.
- 4) Response time between the user and error detection.
- 5) System reliability.

Upon completion of the performances testing, it can be stated that system already meet operational requirements and will be reevaluated again with customer needs.

6.3.3.2 RECEIVING TESTING.

System developer will conduct both function and performances testing. Customer will than appoint an expert to conduct their own testing which is known as receiving testing.

6.4 TESTING RESULT ANALYSIS.

The summary from the testing result are listed below:

1) Achieving Main Objective.

As planned the main objective for the system development had been achieved. The system can receive customers order and provide feedback regarding the status of their vehicle.

2) Additional Requirements.

Certain aspects of the system need to be upgraded for better interaction between user and system.

6.5 MAINTENANCE.

Maintenance to the system needs to be performed to support any changes in the system module. Below are the maintenance program needs to be implemented.

6.5.1. CORRECTIVE MAINTENANCE.

The maintenance team will focus on the maintenance activities of the daily system function. If failure did occurred, the problem need to be studied so that rectification work can be undertaken. User must be informed in case of any changes in the system and the changes must be documented.

6.5.2. COMPATIBILITY MAINTENANCE.

Any changes in one module resulting direct effect to other modules.

6.5.3. PERFECTION MAINTENANCE.

Maintenance event required to be performed to full proof the existing system for future changes. Below guidelines must be emphasized:

- a) Changes in the system documentation.
- b) Further testing to enhance the current testing level.
- c) Changes in the code and design for performances enhancement.

6.5.4. PREVENTIVE MAINTENANCE.

Preventive program is similar to the perfection maintenance to deter any failure in the system. Additional inspection must be carried out to improve failure-handling method. These activities should be considered for future references to maintain and upgrade the existing method.

7.0. SYSTEM IMPLEMENTATION.

7.1. INTRODUCTION.

In this final chapter highlights the problem faced during the project development and how it was encountered. The advantages and disadvantages of the system and suggestion for future enhancement will also be discussed.

7.2. PROBLEM AND ACTION TAKEN.

During the system development a few problems arise and were tackled promptly. Below is the difficulty that was faced.

7.2.1. LIMITED TIME FOR SYSTEM DEVELOPMENT.

Too much time was spent for discussion and analysis process, before developing the system design, coding, implementation and testing. Due to lack of knowledge on what program language suitable to use also cause the delay. In order to overcome these problems schedule and time limit need to be done first. Furthermore the all the module had been develop together.

7.2.2 PROBLEM WITH EQUIPMENT CHOOSEN.

Because of I am the first to develop the computerize car workshop so it is so difficult to choose what program language to use to develop the system. After further discussion and research it was found that visual basic and database application was suitable for this system.

7.3. SYSTEM ADVANTAGES.

The advantages of the computerized car workshop are:

1) User-friendly

Overall the system developed was easy to use and briefly it does not function like MSDOS but it has user interface. Icon and scroll bar also are used so that the user can utilize the system more effectively

2) Information and Easy to Used

The user can get the information about employee details, inventory details, customer details very easy whenever they want this way all the management staff can plan very well.

7.4 SYSTEM DISADVANTAGES.

The speed of data sending will be slow when the hard disk memory is full. Thus making the system to response slower when input key in. So the best way is to store the customer details in a server.

7.5 FUTURE PLANNING AND DEVELOPMENT.

1) To make on line reservation.

2) To have price list of service.

7.6 CONCLUSION:

To develop the computerize car workshop are not an easy task but I was able to achieve the main objective of this project. We had finished the system according to the schedule allocated even though we encountered many problems.

This job is quite challenging and requires a lot of time, discipline and patience. During the system development I have learned a lot of things such as how to use complex language program and to understand then software function.

BIBLIOGRAFI

- 1) **Software Engineering, Theory and Practice**
by Shari LAWRENCE Pfeegeer, Prentice-Hall, 1998
- 2) **<http://nightflight.com/cgi-bin/foldoc.cgi?Waterfall+Model>**
- 3) **<http://www.microsoft.com/vbscript>**
- 4) **www.microsoft.com/access2000**
- 5) **www.microsoft.com/frontpage**
- 6) **www.google.com**
- 7) **www.yahoo.com**

CUSTOMER

CustomerID: C1
Name: VICK
Address: 123 STREET NAME, KUALA LUMPUR
Phone: 012-3456789
Email: vick@domain.com

CustomerID: C2
Name: KAMAL
Address: 456 JALAN BUKIT JAMBIL
Phone: 011-2345678
Email: kamal@domain.com

APPENDIX

CustomerID: C3
Name: RASNAH
Address: 789 JALAN SRI MANGKALA
Phone: 017-8765432
Email: rasnah@domain.com

CustomerID: C4
Name: ALAN
Address: 101 JALAN BUKIT BAYAN
Phone: 019-9876543
Email: alan@domain.com

CustomerID: C5
Name: ONG KOK WEI
Address: 202 JALAN BUKIT TUNJAI
Phone: 016-5432109
Email: kokwei@domain.com

CUSTOMER

CustomerID C1
Name VICK
Address 12/1 /1 LENGKOK MAHSURI

PlateNo	Type
PCD343	WIRA 1.3

CustomerID C2
Name KAMAL
Address 12 TAMAN BUKIT JAMBUL,

PlateNo	Type
PCD7576	NISSAN 1.3

CustomerID C3
Name HASNAH
Address 48 TAMAN SRI MEWAH,BAY

PlateNo	Type
PCR3432	WIRA 1.5 M

CustomerID C4
Name RAJAN
Address 67 TAMAN JUBLI, BAYAN L

PlateNo	Type
PCR559	WIRA 1.5 M

CustomerID C5
Name ONG KOK WEI
Address 67 TAMAN RAMLI TUAH, AI

PlateNo	Type
PDF6573	WIRA 1.3 M

DAILY EARNING

Date	Amount
2/3/2002	\$2,000.00
3/3/2002	\$300.00
4/3/2002	\$200.00

Date	PartID	PartName	Quantity Sold	Total Amount
2/3/2002	P1	LIGHT	300	\$2000.00
3/3/2002	P2	OIL FILTER	200	\$300.00
4/3/2002	P3	PLUG	200	\$200.00

University of Malaya

DailyQuantitySold

Date by Day Sunday, February 03, 2002

Date	PartID	PartName	QuantitySold	TotalAmount
2/3/2002	P1	LIGHT	300	\$300.00

Date by Day Sunday, March 03, 2002

Date	PartID	PartName	QuantitySold	TotalAmount
3/3/2002	P3	OIL FILTER	200	\$300.00
3/3/2002	P2	PLUG	200	\$200.00

MonthlyQuantitySold

Month APRIL2002

PartID	PartNama	QuantitySold	TotalAmount
P4	PATROL FILTER	200	\$200.00

Month FEBRUARY2002

PartID	PartNama	QuantitySold	TotalAmount
P2	OIL FILTER	200	\$300.00

Month JANUARY2002

PartID	PartNama	QuantitySold	TotalAmount
P1	LIGHT	200	\$200.00

Month MARCH2002

PartID	PartNama	QuantitySold	TotalAmount
P3	AIR FILTER	200	\$200.00

Month MAY2002

PartID	PartNama	QuantitySold	TotalAmount
P5	WIPER	200	\$200.00

ORDER

OrderID A1 Total \$499.00
Date 3/3/2001 EMPLOYEES_NA LIM KOK CHUN
☒ Received SUPPLIER_Name LOT10
Last Received Date 4/4/2002

CatalogID	PartName	yOrdered	UnitPrice	TotalPrice	QuantityReceived
Z1	P1	300	\$50.00	\$15,000.00	300

OrderID A2 Total \$677.00
Date 6/5/2002 EMPLOYEES_NA AHMAD SHAIFUL
☒ Received SUPPLIER_Name PLASTIC INC
Last Received Date 5/5/2002

CatalogID	PartName	yOrdered	UnitPrice	TotalPrice	QuantityReceived
Z2	P2	400	\$200.00	\$800.00	400

OrderID A3 Total \$666.00
Date 4/5/2002 EMPLOYEES_NA LIM SHU CHIN
☒ Received SUPPLIER_Name WAWASAN
Last Received Date 4/6/2002

CatalogID	PartName	yOrdered	UnitPrice	TotalPrice	QuantityReceived
Z3	P3	400	\$30.00	\$12,000.00	400

PARTS LOW STOCK

PartNo	Name	Quantity	Brand	lowstock
P8	WIPER	45	TOMSAN	50
P9	PLUG	33	DOT3	50

University of Malaya

PARTS QUANTITY STOCK

<i>PartNo</i>	<i>Name</i>	<i>Quantity</i>
P1	LIGHT	300
P2	BRAKE OIL	500
P3	TAIMING BELT	800
P4	ENGINE OIL	700
P5	OIL FILTER	300
P6	AIR FILTER	700
P7	COLLENT	435
P8	WIPER	45
P9	PLUG	33
P10	PETROL FILTER	200

PARTS SOLD MONTH

PartNo	Name	Price	Quantity	TotalPrice
P3	TAIMING BELT	\$7,000.00	300	\$300.00
P2	BRAKE OIL	\$999.00	200	\$300.00
P1	LIGHT	\$444.00	100	\$200.00

ReservationDate by Sunday, April 07, 2002

Customer	Name	Address	TelNo	MobileNo	Date ReservationDate
04	SAINT	87 TAMAN AJ	04-2534567	016-2534567	4/7/2002

ReservationDate by Friday, May 03, 2002

Customer	Name	Address	TelNo	MobileNo	Date ReservationDate
04	JOY	123 4 LEMBA	04-2534567	016-2534567	5/3/2002

ReservationDate by Monday, May 06, 2002

Customer	Name	Address	TelNo	MobileNo	Date ReservationDate
05	WISMAN	87 TAMAN AJ	04-2534567	016-2534567	5/6/2002

Customer	Name	Address	TelNo	MobileNo	Date ReservationDate
04	JOY	123 4 LEMBA	04-2534567	016-2534567	5/6/2002

ReservationDate by Wednesday, June 05, 2002

Customer	Name	Address	TelNo	MobileNo	Date ReservationDate
04	ONG KONG WEI	87 TAMAN AJ	04-2534567	016-2534567	6/5/2002

ReservationDate by Thursday, June 06, 2002

Customer	Name	Address	TelNo	MobileNo	Date ReservationDate
04	JOY	123 4 LEMBA	04-2534567	016-2534567	6/6/2002

RESERVATION

ReservationDate by Thursday, March 07, 2002

Time 3 PM

CustomerI	Name	Address	TelNo	MobileNo	Date	ReservationDate
C2	KAMAL	12 TAMAN BU	04-3377878	012-5673945	0/2002	3/7/2002

ReservationDate by Sunday, April 07, 2002

Time 10.30 AM

CustomerI	Name	Address	TelNo	MobileNo	Date	ReservationDate
C4	RAJAN	67 TAMAN JU	04-7834987	012-3456743	9/2002	4/7/2002

ReservationDate by Friday, May 03, 2002

Time 2.30PM

CustomerI	Name	Address	TelNo	MobileNo	Date	ReservationDate
C1	VICK	12/1 /1 LENGK	04-6266745	016-4589814	2/2002	5/3/2002

ReservationDate by Monday, May 06, 2002

Time 10 AM

CustomerI	Name	Address	TelNo	MobileNo	Date	ReservationDate
C3	HASNAH	48 TAMAN SRI	04-9856909	013-5634589	8/2002	5/6/2002

Time 11 AM

CustomerI	Name	Address	TelNo	MobileNo	Date	ReservationDate
C6	RANJIT SING	23 TAMAN SRI	04-6783999	017-5673865	6/2002	5/6/2002

ReservationDate by Wednesday, June 05, 2002

Time 4.30 PM

CustomerI	Name	Address	TelNo	MobileNo	Date	ReservationDate
C5	ONG KOK WEI	67 TAMAN RA	04-7383738	016-6785222	5/2002	6/5/2002

ReservationDate by Thursday, June 06, 2002

Time 11.30 AM

CustomerI	Name	Address	TelNo	MobileNo	Date	ReservationDate
-----------	------	---------	-------	----------	------	-----------------

TotalEarning

Month	Amount
January2002	\$48,990.00
February2002	\$60,000.00
March2002	\$70,000.00

Service ID	Service Date	Plate No	Service Description
015-438914			
CustomerID	C2		
Name	KAMAL		
Phone	912-3573943		
Service ID	Service Date	Plate No	Service Description
015-438914			
CustomerID	C4		
Name	RAJAN		
Phone	912-3573943		
Service ID	Service Date	Plate No	Service Description
015-438914			
CustomerID	C4		
Name	RAJAN		
Phone	912-3573943		

UNFINISH SERVICE

CustomerID C1
Name VICK

TelNo

MobileNo 016-4589814

Service ID	ervice Date	Plate No	Service Description
S1	5/6/2002	PCD343	SERVICE

CustomerID C2
Name KAMAL

TelNo

MobileNo 012-5673945

Service ID	ervice Date	Plate No	Service Description
S2	6/7/2002	PCD7576	SERVICE

CustomerID C3
Name HASNAH

TelNo

MobileNo 013-5634589

Service ID	ervice Date	Plate No	Service Description
S3	7/7/2002	PCR3432	SERVICE

CustomerID C4
Name RAJAN

TelNo

MobileNo 012-3456743

Service ID	ervice Date	Plate No	Service Description
------------	-------------	----------	---------------------